In the claims:

1. (Currently Amended)   A voice recognition system comprising a spectrum converter for elongating or contracting a~~the~~ spectrum of a voice signal on a~~the~~ frequency axis, the spectrum converter including:

an analyzer for converting an input voice signal to an input pattern including cepstrum;

a reference pattern memory with reference patterns stored therein;

an elongation/contracting estimating unit for outputting an elongation/contraction parameter in the frequency axis direction by using the input pattern and the reference patterns; and

a converter for converting the input pattern by using the elongation/contraction parameter;

wherein said elongating or contracting of the spectrum of the voice signal is carried out using an expansion-compression coefficient obtained by retrieval in two dimensional space such that one value of the coefficient is obtained for each utterance.

2. (Currently Amended)   A voice recognition system comprising:

an analyzer for converting an input voice signal to an input pattern including a cepstrum;

a reference pattern memory for storing reference patterns;

an elongation/contraction estimating unit for outputting an elongation/contraction parameter in the frequency axis direction by using the input pattern and reference patterns;

a converter for converting the input pattern by using the elongation/contraction parameter; and

a matching unit for computing the distances between the elongated or contracted input pattern fed out from the converter and the reference patterns and outputting the reference pattern corresponding to the shortest distance as result of recognition;

wherein said elongation/contraction parameter is based on an expansion-compression coefficient obtained by retrieval in two dimensional space such that one value of the coefficient is obtained for each utterance.

3. (Currently Amended)   The voice recognition system according to claim 1, wherein the converter executes the elongation or contraction of the spectrum on the frequency axis with a warping function defining the form of elongation or contraction by carrying out the elongation or contraction in cepstrum space.

4. (Currently Amended)   The voice recognition system according to claim 1, wherein the elongation/contraction estimating unit executes the elongation or contraction of the spectrum on the frequency axis with a warping function defining the form of elongation or contraction by using estimation derived from the best likelihood estimation of HMM (hidden Marcov model) in a cepstrum space.

5. (Currently Amended)   A reference pattern learning system comprising:

a learning voice memory with learning voice data stored therein;

an analyzer for receiving a learning voice signal from the learning voice memory and converting the learning voice signal to an input pattern including cepstrum;

a reference pattern memory with reference patterns stored therein;

an elongation/contraction estimating unit for outputting an elongation/contraction parameter in a frequency axis direction by using the input pattern and the reference patterns;

a converter for converting the input pattern by using the elongation/contraction pattern;

a reference pattern estimating unit for updating the reference patterns stored in the reference pattern memory for the learning voice data by using the elongated or contracted input pattern fed out from the converter and the reference patterns; and

a likelihood judging unit for monitoring distance changes by computing distances by using the elongated or contracted input pattern fed out from the converter and the reference patterns;

wherein said elongation/contraction parameter is based on an expansion-compression coefficient obtained by retrieval in two dimensional space such that one value of the coefficient is obtained for each utterance.

6. (Currently Amended)   The reference pattern learning system according to claim 5, wherein the converter executes the elongation or contraction of spectrum on the frequency axis with a warping function defining the form of elongation or contraction by carrying out the elongation or contraction in cepstrum space.

7. (Currently Amended)   The reference pattern learning system according to claim 5, wherein the elongation/contraction estimating unit executes the elongation or contraction of spectrum on the frequency axis with a warping function defining the form of elongation or contraction by using estimation derived from the best likelihood estimation of HMM (hidden Marcov model) in cepstrum space.

8. (Currently Amended)   A voice quality converting system comprising:

an analyzer for converting an input voice signal to an input pattern including a cepstrum;

a reference pattern memory for storing reference patterns;

an elongation/contraction estimating unit for outputting an elongation/contraction parameter in the frequency axis direction by using the input pattern and reference patterns;

a converter for converting the input pattern by using the elongation/contraction parameter; and

an inverse converter for outputting a signal waveform in time domain by inversely converting the time serial input pattern obtained after the elongation/contraction supplied from the converter

wherein said elongation/contraction parameter is based on an expansion-compression coefficient obtained by retrieval in two dimensional space such that one value of the coefficient is obtained for each utterance.

9. (Currently Amended)   A recording medium for a computer constituting a spectrum converter by executing elongation or contraction of the spectrum of a voice signal on frequency axis, in which is stored a program for executing the following processes:

(a)   an analyzing process for converting an input voice signal to an input pattern including cepstrum,

(b)   an elongation/contraction estimating process for outputting an elongation/contraction parameter in frequency axis direction by using the input pattern and reference patterns stored in a reference pattern memory; and

(c)   a converting process for converting the input pattern by using the elongation/contraction parameter

wherein said elongation/contraction parameter is based on an expansion-compression coefficient obtained by retrieval in two dimensional space such that one value of the coefficient is obtained for each utterance.

10. (Currently Amended) A recording medium for a computer constituting a system for voice recognition by executing elongation or contraction of a~~the~~ spectrum of a voice signal on a frequency axis, in which is stored a program for executing the following processes:

(a) an analyzing process for converting an input voice signal to an input pattern including cepstrum,

(b) an elongation/contraction estimating process for outputting an elongation/contraction parameter along the ~~in~~-frequency axis ~~direction~~ by using the input pattern and reference patterns stored in a reference pattern memory;

(c) a converting process for converting the input pattern by using the elongation/contraction parameter; and

(d) a matching process for computing the distances between the elongated or contracted input pattern and the reference patterns and outputting the reference pattern corresponding to the shortest distance as result of recognition

wherein said elongation/contraction parameter is based on an expansion-compression coefficient obtained by retrieval in two dimensional space such that one value of the coefficient is obtained for each utterance.

11. (Currently Amended) The recording medium according to claim 10, wherein the converting process executes the elongation or contraction of spectrum on the frequency axis with a warping function defining the form of elongation or contraction by carrying out the elongation or contraction in cepstrum space.

12. (Currently Amended)   The recording medium according to claim 10, wherein the elongation/contraction estimating process executes the elongation or contraction of the spectrum on the frequency axis with a warping function defining the form of elongation or contraction by using estimation derived from the best likelihood estimation of HMM (hidden Marcov model) in cepstrum space.

13. (Currently Amended)   In a computer constituting a system for learning reference patterns from learning voice data, a recording medium, in which is stored a program, for executing the following processes:

(a)   an analyzing process for receiving learning voice data from learning voice memory with learning voice data stored therein and converting the received learning voice data to an input pattern including cepstrum;

(b)   an elongation/contraction estimating process for outputting an elongation/contraction parameter along a in-frequency axis direction by using the input pattern and the reference patterns stored in the reference pattern memory;

(c)   a converting process for converting the input pattern by using the elongation/contraction parameter;

(d)   a reference pattern estimating process for updating the reference patterns for the learning voice data by using the elongated or contracted pattern fed out in the converting process and the reference patterns and;

(e)   a likelihood judging process for calculating the distances between the elongated or contracted input pattern after conversion in the converting process and the reference patterns and monitoring changes in distance

wherein said elongation/contraction parameter is based on an expansion-compression coefficient obtained by retrieval in two dimensional space such that one value of the coefficient is obtained for each utterance.

14. (Currently Amended)   The recording medium according to claim 13, wherein the converting process executes the elongation or contraction of the spectrum on the frequency axis with a warping function defining the form of elongation or contraction by carrying out the elongation or contraction in cepstrum space.

15. (Currently Amended)   The recording medium according to claim 13, wherein the elongation/contraction estimating process executes the elongation or contraction of the spectrum on the frequency axis with a warping function defining the form of elongation or contraction by using estimation derived from the best likelihood estimation of HMM (hidden Marcov model) in cepstrum space.

16. (Currently Amended)   A recording medium for a computer constituting a spectrum conversion by executing elongation or contraction of the spectrum of a voice signal on a frequency axis, in which is stored a program for executing the following processes:

(a)   an analyzing process for converting an input voice signal to an input pattern including cepstrum,

(b)   an elongation/contraction estimating process for outputting an elongation/contraction parameter along the in-frequency axis direction by using the input pattern and reference patterns stored in a reference pattern memory;

(c)   a converting process for converting the input pattern by using the elongation/contraction parameter; and

(d)   an inverse converting process for outputting a signal waveform in time domain by inversely converting the time serial input pattern obtained after the elongation/contraction supplied from the converter

wherein said elongation/contraction parameter is based on an expansion-compression coefficient obtained by retrieval in two dimensional space such that one value of the coefficient is obtained for each utterance.

17. (Currently Amended)   A spectrum converting method for elongating or contracting a~~the~~ spectrum of a voice signal on a~~the~~ frequency axis, comprising:

a first step for converting an input voice signal to an input pattern including cepstrum;

a second step for outputting an elongation/contraction parameter in the frequency axis direction by using the input pattern and the reference patterns stored in a reference pattern memory; and

a third step for converting the input pattern by using the elongation/contraction parameter

wherein said elongation/contraction parameter is based on an expansion-compression coefficient obtained by retrieval in two dimensional space such that one value of the coefficient is obtained for each utterance.

18. (Currently Amended)   A voice recognition method comprising:

a first step for converting an input voice signal to an input pattern including a cepstrum;

a second step for outputting an elongation/contraction parameter ~~in the~~ along a frequency axis ~~direction~~ by using the input pattern and reference patterns stored in a reference pattern memory;

a third step for converting the input pattern by using the elongation/contraction parameter; and

a fourth step for computing the distances between the elongated or contracted input pattern arid the reference patterns and outputting the reference pattern corresponding to the shortest distance as result of recognition

wherein said elongation/contraction parameter is based on an expansion-compression coefficient obtained by retrieval in two dimensional space such that one value of the coefficient is obtained for each utterance.

19. (Currently Amended)   The voice recognition method according to claim 17, wherein the elongation or contraction of the spectrum on the frequency axis with a warping function defining the form of elongation or contraction is executed by carrying out the elongation or contraction in cepstrum space.

20. (Currently Amended)   The voice recognition method according to claim 17, wherein the elongation/contraction estimating process executes the elongation or contraction of the spectrum on the frequency axis with a warping function defining the form of elongation or contraction by using estimation derived from the best likelihood estimation of HMM (hidden Marcov model) in cepstrum space.

21. (Currently Amended)   A reference pattern learning method comprising:

a first step for receiving a learning voice signal from the learning voice memory and converting the learning voice signal to an input pattern including cepstrum;

a second step for outputting an elongation/contraction parameter along a in-frequency axis direction by using the input pattern and the reference patterns stored in a reference pattern memory;

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a third step for converting the input pattern by using the elongation/contraction pattern;

a fourth step for updating the reference patterns for the learning voice data by using the elongated or contracted input pattern and the reference patterns; and

a fifth step for monitoring distance changes by computing distances by using the elongated or contracted input pattern and the reference patterns

wherein said elongation/contraction parameter is based on an expansion-compression coefficient obtained by retrieval in two dimensional space such that one value of the coefficient is obtained for each utterance.

22. (Currently Amended)   The reference pattern learning method according to claim 21, wherein the third step executes the elongation or contraction of the spectrum on the frequency axis with a warping function defining the form of elongation or contraction by carrying out the elongation or contraction in cepstrum space.

23. (Currently Amended)   The reference pattern learning method according to claim 21, wherein the second step executes the elongation or contraction of the spectrum on the frequency axis with a warping function defining the form of elongation or contraction by using estimation derived from the best likelihood estimation of HMM (hidden Marcov model) in cepstrum space.

24. (Currently Amended)   A voice recognition method of spectrum conversion to convert a the spectrum of a voice signal by executing elongation or contraction of the spectrum on a frequency axis, wherein:

the spectrum elongation or contraction of the spectrum of the input voice signal is as defined by a warping function and is executed on cepstrum, and the extent of elongation or

contraction of the spectrum on the frequency axis is determined with an elongation/contraction parameter included in the warping function, and an optimum value is determined as elongation/contraction parameter value for each speaker

wherein said elongation/contraction parameter is based on an expansion-compression coefficient obtained by retrieval in two dimensional space such that one value of the coefficient is obtained for each utterance.

--25. (Currently Amended)   The voice recognition system according to claim 2, wherein the converter executes the elongation or contraction of the spectrum on the frequency axis with a warping function defining the form of elongation or contraction by carrying out the elongation or contraction in cepstrum space.

26. (Currently Amended)   The voice recognition system according to claim 2, wherein the elongation/contraction estimating unit executes the elongation or contraction of the spectrum on the frequency axis with a warping function defining the form of elongation or contraction by using estimation derived from the best likelihood estimation of HMM (hidden Marcov model) in cepstrum space.

27. (Currently Amended)   The voice recognition system according to claim 3, wherein the elongation/contraction estimating unit executes the elongation or contraction of the spectrum on the frequency axis with a warping function defining the form of elongation or contraction by using estimation derived from the best likelihood estimation of HMM (hidden Marcov model) in cepstrum space.

28. (Currently Amended)   The reference pattern learning system according to claim 6, wherein the elongation/contraction estimating unit executes the elongation or contraction of the spectrum on the frequency axis with a warping function defining the form of elongation or contraction by using estimation derived from the best likelihood estimation of HMM (hidden Marcov model) in cepstrum space.

29. (Currently Amended)   The voice recognition method according to claim 18, wherein the elongation or contraction of the spectrum on the frequency axis with a warping

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function defining the form of elongation or contraction is executed by carrying out the elongation or contraction in cepstrum space.

30. (Currently Amended)   The voice recognition method according to claim 18, wherein the elongation/contraction estimating process executes the elongation or contraction of the spectrum on the frequency axis with a warping function defining the form of elongation or contraction by using estimation derived from the best likelihood estimation of HMM (hidden Marcov model) in cepstrum space.

31. (Currently Amended)   The voice recognition method according to claim 19, wherein the elongation/contraction estimating process executes the elongation or contraction of the spectrum on the frequency axis with a warping function defining the form of elongation or contraction by using estimation derived from the best likelihood estimation of HMM (hidden Marcov model) in cepstrum space.--